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dents form about 30 per cent., the remainder being transient visitors in winter, spring and fall, of which about 106 species are of merely casual occurrence, with only from one to half a dozen records within the state for each.

The nomenclature and classification adopted conform to the third edition of the A. O. U. Checklist, which renders unnecessary the citation of original references for the genera and species. The author has also adopted a concise method of citing the Colorado references under each species, where the name of the author, an abbreviated date and a page reference direct the reader to the full title and place of publication of the paper given in the bibliography near the close of the volume (pp. 532-551), which mentions every publication of importance relating to Colorado ornithology up to December, 1910. This is followed by a gazetteer of the localities specially mentioned (pp. 553-562). With the keys to the higher groups, genera and species, the very satisfactory descriptions, the notes on distribution and habits, the author has succeeded in providing an admirable handbook of Colorado ornithology. Although there are here and there a few minor slips, the work bears the earmarks of a practised hand, and shows a thorough mastery of the subject, although the author's sojourn in Colorado was a comparatively brief one and his personal experience with Colorado birds thus necessarily limited.

The work is dedicated to his friend and patron, the late General Palmer, whose portrait forms the frontispiece of the volume. The half-tone plates illustrate the nesting habits of a number of interesting species, from photographs by well-known Colorado ornithologists. A contour map shows the principal streams, the counties and county-seats of the state, and indicates on a small scale the diversity of altitude and physical features.

J. A. A.

#### BOTANICAL NOTES

##### THE GARDEN IN EDUCATION

DORA WILLIAMS has done a good thing in writing a little book on "Gardens and their Meaning" (Ginn), and doing it in such an at-

tractive way that its reading is certain to accomplish what the author desired, namely, "to show the importance of science in the use of spade and hoe, and to urge that a garden for education may be, not merely in substance, but in spirit, a corner of the great world." A serial citation of the headings of the thirteen chapters will develop the topic, while at the same time giving the substance of the author's message. Thus we find headings as follows: What Makes a School Worth While? Little Studies in Cooperation; Situation and Soil; Plotting and Planning; A Word for Good Tools; Planting; The Art of Making Things Grow; Just How; Garden Foes and Garden Friends; Side Shows; New Life in Old Subjects; The Young Farmer's Almanac; The New Agriculture. The reader who knows something of the place of the garden in education can easily fill in most of these chapter headings, but few can do it in such enthusiastic words and such a genuine spirit of helpfulness and hopefulness. Her closing sentence may well be quoted as giving the purpose of the book:

Gardening, then, worked out at school after some such plan as has been sketched in these pages, will be a powerful lever to raise agriculture—rightly viewed the most rewarding of occupations—from the humble plane, where it has long remained, to the heights which it is destined to command.

The book is evidently designed for adults and the older only of the school children. It should be widely read and discussed in the "reading circles," especially those composed of earnest teachers, where it should do much good. One is tempted to suggest that the author should now write a complementary book for the children, a difficult task, but one for which she appears to be well fitted.

#### AN ISLAND FLORA

ABOUT seven years ago the California Academy of Sciences sent a scientific expedition to the Galapagos Islands (500 to 600 miles west of Ecuador), one of the incidents of which was an eleven days' visit to Cocos Island about midway between Costa Rica and the archipel-

ago. The botanical results of this visit are now published by Alban Stewart, botanist to the expedition,<sup>1</sup> which has just appeared under date of January, 1912.

The island includes between eight to ten square miles and rises often abruptly from the water, culminating in a mountain cone 2,788 feet high, evidently volcanic, but now heavily covered with a dense vegetation. The rainfall is abundant, and the temperature ranges from 68° to 92° F. Near the shore are coconut trees, but no mangroves, "possibly because of the absence of quiet bays and lagoons."

The interior of the island is covered for the most part with rain forests, in which the vegetation is usually so dense that even at midday, with the sun shining, the light is almost as diffuse as at twilight.

The trees are large and tall, reaching a hundred feet or more. "The largest and probably the most important tree from an economic standpoint is one which bears the common name of 'Ironwood'" of which there are trees on the island "so large that timbers  $3 \times 3 \times 60$  feet could be cut from them."

In summing up the results of his study of the vegetation of the island the author says:

The flora of Cocos, like that of the Galapagos Islands, is distinctly that of an oceanic island. The relatively large number of ferns, the much smaller number of species in the remaining families, and the total number of species found on the island lend support to this view. The flora is probably of much more recent origin than is that of the Galapagos Islands. . . . It seems possible that the time that has elapsed since conditions on the island were suitable for the growth of higher vegetation has not been sufficient to stock the island by the slow process of seed dissemination, over considerable areas of water, with as many species as it is capable of supporting. The small number of endemic species on the island might also point to a relatively recent origin of its flora.

#### SYSTEMATIC NOTES

It is a hopeful sign that from time to time Professor Schaffner brings out papers on the

<sup>1</sup> *Proc. Calif. Acad. Sci.*, 4th series, Vol. 1.

classification of plants, the last of which appeared in the *Ohio Naturalist* for December, 1911. In this he reviews and rearranges some of his previous schemes, and adds a synopsis of the phyla, classes and subclasses of the whole vegetable kingdom. In the latter he recognizes fifteen phyla, viz: Schizophyta, Myxophyta, Zygomphyta, Gonidiophyta, Phaeophyta, Rhodophyta, Charophyta, Mycophyta, Bryophyta, Ptenophyta, Calamophyta, Lepidophyta, Cycadophyta, Strobilophyta, Anthophyta. The discussion contains a statement of principles, one of which may well be reproduced here:

In a word, the whole scheme of classification must show the result which has come about through progressive evolution, segregation, degradation and specialization.

Another paper by Henry Pittier on "New or Noteworthy Plants from Colombia and Central America," in the *Contrib. U. S. Natl. Herb.*, Vol. 13, pt. 12, among other things contains a revision of the Artocarpoideae-Olmediae of the family *Moraceae* which will interest critical systematists. Many good plates and text figures add much to the value of the paper.

In part 1 of Vol. 16 of the same Contributions, we find a critical discussion by W. R. Maxon, of the systematic standing of a Rocky Mountain fern known as *Asplenium andrewsii*, which may turn out to be an Americanized form of the European *A. adiantum-nigrum*.

Accompanying the foregoing is a "Report on a Collection of Plants from the Pinacate Region of Sonora," by J. N. Rose and P. C. Standley, in which are given the botanical results of an expedition from the Desert Laboratory at Tucson in 1907, into a region never before visited by a botanical collector. "The botanical collections, although small, have proved to be most interesting." Eighty-four species are enumerated, of which eleven are here described as new to science. Eight of the plants in the list are Monocotyledons, of which seven are grasses. Ten are Cactaceae, while seventeen are Compositae. The fine plates add greatly to the interest of the paper.

Dr. E. L. Greene continues in *Leaflets* (Vol. II., pp. 165-196) the publication of new species from different parts of the country, much space being given to new species of *Apocynum*, of which upwards of forty species are recognized that hitherto have found place under *A. cannabinum* and *A. androsaemifolium*. Half a dozen new species of *Trautvetteria* and five of *Erigeron* complete the fascicle.

Brief notice may be made here of the "Outline Key of the Groups of the Genus *Helianthus* in Michigan," by Mr. S. Alexander, in the Nineteenth Report of the Michigan Academy of Sciences (1911), in which the author brings together for publication some results of his critical studies of these plants in the field and under cultivation. Although incomplete, the paper contains many hints that systematic botanists may well heed.

Dr. A. Nelson's "New Plants from Idaho," in the *Botanical Gazette* for October, 1911, adds a number of new species from southwestern Idaho, a region as yet little known botanically.

Wm. R. Maxon describes (Smithsonian Miscellaneous Collections, Vol. 56, No. 24) "A Remarkable New Fern from Panama," a species of *Polypodium* in which the sori become crowded out so as to appear marginal upon the leaflets. To this species he has given the name *P. podocarpum*, and the hint is thrown out that it may constitute "a distinct generic type."

In M. A. Howe's Phycological Studies, V., in the *Torrey Bulletin* for November, 1911, he publishes a list of nine Chlorophyceae, seven Phaeophyceae, and twelve Rhodophyceae from Lower California, of which eight are new.

From the Institut de Botanique, Université de Geneve, the fifth and sixth fascicles (1910, 1911) contain the usual variety of contributions, ranging from morphology to physiology, pathology and the systematic botany of lower and higher plants, as, a new *Rhamnus*, the green snow of an Alpine

glacier (due to *Ankistrodesmus vireti*), the copulation of *Spirogyra*, the physiological rôle of catalase, a new blue-green alga, etc.

The well-known Minnesota Botanical Studies have begun to appear again, the second part of Vol. IV. bearing date of September 15, 1911. Its four articles are "Observations on the Morphology of the Underground Stems of *Symplocarpus* and *Lysichiton*," by C. O. Rosendahl; "Some Effects of Severe Frost upon Vegetation in a Condition of Active Growth," by F. K. Butters and C. O. Rosendahl; "Notes on the Species of *Liagora* and *Galaxaura* of the Central Pacific," by F. K. Butters; "Nova Fungorum Coloradensium Genera," by F. E. Clements, the last including six new genera of Sphaeriaceae. With this part are given title-page, table of contents and index of Volume III.

#### PATHOLOGICAL NOTES

DR. C. W. EDGERTON's papers "Two New Fig Diseases" (*Phytopathology*, February, 1911), "Diseases of the Fig Tree and Fruit" (Bull. 126, La. Expt. Station, March, 1911), "The Red Rot of Sugar Cane" (Bull. 133, La. Expt. Station, December, 1911), "*Botryosphaeria* on Cotton Bolls" (*Mycologia*, January, 1912), and "Flower Infection with Cotton Boll Rots" (*Phytopathology*, February, 1912), show that botanical activity in the south is bringing good results.

The same thing is shown by J. R. Johnston's "History and Cause of the Coconut Bud-Rot" (Bull. 228, Bureau of Plant Industry, U. S. Dept. Agric., February, 1912), dealing with "a very destructive and widespread disease of coconuts which has been known to occur in Cuba for more than thirty years." The bulletin is the result of investigations in Cuba, Jamaica, Trinidad and British Guiana, covering a period of four years. The remarkable discovery was made that the organism causing this bud-rot is the common *Bacillus coli*, and "it is believed that birds and insects are the carriers of this disease," but to this the author cautiously adds "the subject requires further study."

## MYCOLOGICAL NOTES

THREE papers of much more than usual value in such a publication are found in the *Transactions of the Wisconsin Academy of Sciences, Arts and Letters* (Vol. XVI., Part II., No. 4). The first, by E. M. Gilbert, is entitled "Studies on the Tremellineae of Wisconsin" and includes notes upon twenty-one species belonging to nine genera. Apparently this systematic paper is preliminary to "a further physiological and cytological study of the group." The second paper, "Spore Formation in *Geoglossum glabrum* Pers.," by Hallie D. M. Jolivet, is a careful study of the formation of ascospores, with especial reference to the behavior and significance of the rays of the polar aster. Three fine plates accompany the paper. The longest paper is that by B. F. Lutman, entitled "Some Contributions to the Life History and Cytology of the Smuts." In it the author has reinvestigated the spore-formation and germination of species of smuts belonging to the genera *Ustilago*, *Doassansia*, *Urocystis* and *Entyloma* and compared them with *Tilletia* and other well-known genera. He finds that two groups of smuts may be distinguished—"the *Ustilago* group," and "the *Tilletia*, *Entyloma*, *Urocystis* division," which, he says, "may be more distantly related than has been commonly supposed." These he characterizes as follows: (1) *Ustilago* group, "simple spores produced by the breaking up of the mycelium; intercellular mycelium without haustoria; typically four-celled promycelium"; (2) *Tilletia*, *Entyloma*, *Urocystis* group, spores borne on lateral branches; haustoria; binucleated cells and non-septate promycelium. Eight good plates accompany the paper.

## PALEOBOTANICAL NOTES

A CONCISE statement of one portion of paleobotany is given by Dr. J. M. Coulter in the February number (1912) of the *Popular Science Monthly*, accompanied by a helpful chart showing the relationships of the Cycadofil-

cales, Cordaitales, Bennettiales, Cycadales, Ginkgoales, Coniferales and Gnetales.

The same author and Dr. W. J. S. Land published in the *Botanical Gazette* (June, 1911) a short paper (with two plates) on "An American *Lepidostrobus*" in which the structure of a fragment of a well-preserved cone is described from the central Iowa coal measures. This appears to be the first description of an American *Lepidostrobus* cone.

In a pungent note "On the True Nature of the Cretaceous Plant *Ophioglossum granulatum* Heer." in the *Annals of Botany* (October, 1911) Dr. M. C. Stopes shows that instead of being an *Ophioglossum*, the specimen from the Amboy clays is that of a staminate pine cone, and in proof of this conclusion she figures four pollen grains showing the characteristic wings!

An enumeration of the titles of some of the many papers published in recent years by the well-known paleobotanist G. R. Wieland may be helpful to botanical readers who are interested in this portion of botany, and especially in the method of discovery. Thus in the March, April and May numbers of the *American Journal of Science* for 1889 there appeared, under the general title, "Study of Some American Fossil Cycads," papers on "The Male Flower of Cycadeoidea," "Leaf Structure of Cycadeoidea," and "The Female Fructification of Cycadeoidea," showing that at that time he had made much progress in unraveling the puzzle of the old Cycads. Again later (March, 1900) in his paper on the "Yale Collection of Fossil Cycads" (*Yale Scientific Monthly*) he comes so near to the solution that he finds macrosporangia and microsporangia on the same trunk. Then in a fourth paper under the general title of "Study of Some American Fossil Cycads" he returns again (*Am. Jour. Sci.*, June, 1901) to the microsporangiate fructification of Cycadeoidea, and now makes out the structure of the old *Cycad* flower with its ovulate central cone surrounded by a whorl of pinnate stamens! Later came "The Proembryo of the Bennettiteae" (*Am. Jour. Sci.*, December, 1904); "Historic Fossil Cycads" (*Am. Jour. Sci.*,

February, 1908); "Paleobotany" (reviews in *Am. Jour. Sci.*, April, 1908); "The *Williamsonias* of the Mixteca Alta" (*Bot. Gaz.*, December, 1909); "Further Notes on Seed Structures" (*Am. Jour. Sci.*, August, 1911); "The Williamsonian Tribe" (*Am. Jour. Sci.*, December, 1911), and "The Smaller Flower-buds of *Cycadeoidea*" (*Am. Jour. Sci.*, February, 1912). In the last is ample confirmation of the author's interpretation of the old Cycad flower structure as announced by him nearly eleven years earlier. These papers, with the author's monumental volume, "American Fossil Cycads" (1906) constitute a remarkable example of the gradual uncovering of facts and their successful interpretation, and combination into a consistent phylogenetic scheme.

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#### SPECIAL ARTICLES

##### THE INEFFICIENCY OF WIRES AS A MEANS OF CURING DEFECTIVE ACOUSTICS OF AUDITORIUMS

IN the popular mind, one of the first aids for a hall with poor acoustics is to install a system of wires or strings with the expectation that in some way the defect will be cured. This prevalent idea is doubtless due to the fact that there are many halls where wires have been strung, and people naturally conclude that there must be some merit in the method. As a matter of fact, this popular impression does not seem to be well founded, for the author has inspected a number of halls thus treated, and has found no marked improvement in the acoustics.

Thus in Dr. Parkhurst's church in New York City where a thin network of silk fibers of large mesh was stretched horizontally about half way between the floor and the dome, there still persisted a reverberation and an echo. In the Royal Cathedral in Berlin, a number of silk cords are installed in a horizontal network, yet the acoustics remain very defective. A fishnet is stretched near the ceiling in one of the court rooms of the Berlin Rathhaus

with no benefit to the acoustical properties. The Royal Albert Hall in London has a series of wires installed, and, while the acoustics there are improved, other features than wires have unquestionably produced the effect. The warden of a church in Nottingham, England, writes:

Several dodges were tried to overcome the (acoustical) defect, such as stretching wires across the nave.

And so on for other cases that might be cited.

The conclusions of the author in regard to the inefficiency of wires have not always been in accord with the opinions of the auditors in the various halls mentioned. The janitor of Dr. Parkhurst's church, in answer to the question, "Does the net help the acoustics?" replied, "Some says it does, and some says it don't." In the Royal Cathedral in Berlin, according to the attendant's account, the Kaiser thought the wires produced no improvement while the Kaiserin thought they did. The direct question to the attendant as to his own opinion proved very embarrassing and brought only a shrug of the shoulders. Later conversation, however, revealed his conviction that no help had been rendered. In the majority of cases where opinions were asked for, there was a decided expression against the use of wires—"the acoustics are as bad as before," "The wires have not helped," etc.

Some people, however, claim that the method is advantageous, and that the acoustics are really benefited. The author believes these claims are sincere, but attributes the better hearing to other features than the wires. For instance, the acoustics are usually improved when a large audience is present. Also, the opening of windows produces a good effect. Furthermore, regular attendants in a hall with poor acoustics get used to the defect, and, by an adjustment of the attention, are able in some cases to subordinate the disturbing factors and hear better than before. Thus on one occasion the author fixed his attention on a particularly strong echo and was able to hear more distinctly than by listening to the words